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## CONTENTS.

An Asterisk (*) denotes an illustrated article.


EDITORIALS—

Prospects for Cheaper Gas in Brooklyn, N. Y. ..... 241
Real Civil Service Reform ..... 242
The Management of Small Gas Works ..... 242
New Purifiers for the Providence (R. I.) Works ..... 242
What the Laclede Gas Light Company Wants to do ..... 242
Eleventh Annual Meeting of the American Gas Light Association—Official Report ..... 242
Report of Committee on Selecting Locality for next Place of Meeting—The Proper Combustion of Gas*, by W. W. Goodwin—Fixing Salary of Secretary and Treasurer—Report of Committee on Nomination of Officers.
An Unscrupulous Corporation ..... 249

ITEMS OF INTEREST FROM VARIOUS LOCALITIES ..... 249
Mr. George A. McIlhenny Elected President of the Washington Gas Light Company—Suffocated by Gas—Was it Caused by the Heating Gas?—Gas Mains Injured at Waterbury, Conn.—Cheaper Gas for Columbus, Ind.—He was "Skeered"—Natural Gas Company Incorporated—The St. Louis (Mo.) Injunction Continued—Reduction in Price of Gas at Covington, Ky.—The Lynn (Mass.) Heating Gas Heard from Again—Alterations at the Office of the Hartford (Conn.) Gas Light Company—Electric Storage Still a Failure—so Says Mr. Edison, and so Say We—Careless Blasting Injures a Supply Main of the New York Mutual Gas Company—Electric Light for the Philadelphia (Pa.) Council Chamber—An Electric Light Tower—Put Them Underground—The Bower-Grimston-Thorp Regenerative Burner—Gas Matters at Toledo, Ohio—News from St. Louis, Mo.—The Popular Method of Hunting for a Gas Leak Proves Quite Successful—Another Electric Accident—It is Said They Blew Out the Gas—Cheaper Gas for Scranton, Pa.
The Proposed sale of the Philadelphia (Pa.) Gas Works ..... 251
The Market for Gas Securities ..... 251

CORRESPONDENCE—

Stopped Standpipes ..... 251
The Location of Meters, Gas Distribution, etc. ..... 251


## PROSPECTS FOR CHEAPER GAS IN BROOKLYN, N. Y.

We are informed that the management of the Nassau Gas Light Company, of Brooklyn, N. Y., have determined, after the long and unsuccessful raid made upon them by the oil monopolists, to take some steps by way of retaliation, in an extension of their mains into the sections of the city where the monopolists believed they had everything securely fixed up for raising the price of gas, thus giving them the supposed opportunity, which they were not slow to avail themselves of, of squeezing more money out of the public.

It is a satisfactory thing to learn that there are some people who have a proper conception of what is right and what is wrong, and better still to know that these same people are possessed of the moral courage to act in accordance with their convictions, and who are not so ready to deliver over property, held in trust by them for others, at the beck and call of any set of schemers, whoever they may be. A great deal has been done in this direction by the management of some of the other Brooklyn companies, through what has been termed "missonary work," on the part of those who were supposed to be carrying water on both shoulders, and who spent considerable time in trying to induce people to sell their property for a mere pittance of its true value. The Nassau Company, however, appears to be controlled by men of a very different calibre, who are not so ready and willing to deliver over the property in their custody, notwithstanding the threat held out to them that "You had better settle now, and on these terms; it will cost you more if you put it off."

If the people of the city of Brooklyn wish to be fairly and honestly dealt with, in the purchase and sale of a commodity, (the use of which has long since ceased to be a luxury) of a kind and quality which can be employed in lighting their homes without any danger to health and life, they will, in every way aid and sustain the Nassau Company in protecting its property, and encourage the management in its efforts to sell gas at a fair and reasonable figure. Let it be thoroughly understood, once for all, that should the oil monopolists eventually succeed in getting entire control of the gas supply of Brooklyn, the price is bound to be advanced, and the consumers be forced to contribute of their substance in order that the capacious maw of the monopolists may be partially satisfied.

That this is so will be readily understood when a glance over the Brooklyn gas field is taken. The Citizens, Metropolitan and Peoples companies are charging $2.50 per thousand for the gas they sell; not one of these three concerns now operates its gas manufacturing plant, all being supplied by the Fulton Municipal Company, which is merely a creature of the Standard oil monopoly. Now, it is not for a moment to be supposed that the concerns above-named could not sell gas at $2 per thousand, and make fair dividends for their stockholders, if each were disposing of gas that was being made at its own works; and thus 50 cents per thousand would not be plundered out of the consumer's pocket simply to go into the treasury of the oil monopolists, and for no other purpose.

If, as is asserted, the Brooklyn Gas Light Company is compelled to pay $84,000 per year to the monopoly, it can be easily understood that this sum has to come out of the public pocket; and should the monopolists prove finally successful in the endeavor to control the entire gas interest of Brooklyn, the people will be compelled to contribute not less than $600,000 annually for the privilege of allowing others to supply them with gas. These facts should be duly and thoroughly considered and digested by every

one interested in the matter; and when gas is offered (as we are told has been and is now being done in the Nassau district) for one, two, or three months, without any charge for the same, remember that this is only a bait held out to catch the unwary, with the ultimate object of bringing the old established company to terms in as short a space of time as possible.

We have always believed in a fair return upon all capital invested in business operations of any style or description; but in a business such as that of the gas-maker, whose product has reached the proportions of an actual public necessity, fair and reasonable dividends only ought to be allowed by law; and it should be put out of the power of any and all schemers to increase, at their sweet will, the cost of an article so necessary to the comfort and convenience of the household and the shop.

We would advise the people of Brooklyn to stand by the Nassau Company in its effort to deal fairly with the community in selling gas at a reasonable price, and to aid its management in every way and manner to crush out the schemers now engaged in the effort to tax gas light as successfully as they have taxed kerosene oil. See to it that you are not led away with fair-seeming promises, the falsity and hollowness of which will be exposed if the raiders can accomplish their object in fastening their fangs in the throats (and the pockets) of the gas consumers of Brooklyn.

## REAL CIVIL SERVICE REFORM.

From a perusal of our "Item" columns it will be noticed we chronicle the pleasing information that Mr. George A. McIlhenny has been elected to the presidency of the Washington (D. C.) Gas Light Company. It is eminently proper and fitting that "civil service rules" should be observed and followed out in the city in which is located the seat of our national government, and we but voice the general feeling of the gas fraternity of America in saying that the promotion of Mr. McIlhenny will be everywhere hailed by the brotherhood with pleasure and pride. The work accomplished by Mr. McIlhenny, in guiding the manufacturing operations of his company for many years past, speaks for itself; and no words of ours could add anything to the value of the example of which his professional career has been such a clear exponent. The Washington Company has added to the ramparts of its strongly-fortified position by this latest move, and we hope that Mr. McIlhenny will live for many long and happy years to enjoy the full fruition of the reward so justly merited.

## THE MANAGEMENT OF SMALL GAS WORKS.

In response to the numerous inquiries made at this office for copies of the JOURNAL containing the series of articles, on "The Management of Small Gas Works," by Mr. C. J. Russell Humphreys, we have decided to compile the same into book form. Mr. Humphreys has handled the subject in such manner as to be readily understood; his object having been to place before those interested in the management of small works in this country a practical synopsis of the chief points necessary to a choice of location, disposition of plant, together with hints as to the most economical and effective methods of manufacture and distribution. The price of the book will be $1 per copy; it will be ready for delivery in about ten days, and orders for same should be sent to A. M. Callender & Co., 42 Pine street, New York City.

## New Purifiers for the Providence (R. I.) Works.

Messrs. Bartlett, Hayward & Co., of Baltimore, Md., have recently constructed, at Providence, R. I., for the Providence Gas Company at their "West Station," a set of four purifiers, in line, 20′ × 24′ each, with Isbell's valves, in place of the usual center seal. The valves are opened and closed by means of levers conveniently arranged at the sides of the boxes, and can be operated without lifting any trap-doors, or going down-stairs.

Among the advantages claimed for these valves may be noted that one, two, three or four of the purifiers can be used at once, or any number in any sequence that may be desirable. Messrs. Bartlett, Hayward & Co., have done themselves credit both in the character of the work performed, and in the prompt and business-like manner in which it has been prosecuted.

## What the Laclede Gas Light Company Wants to do.

The Laclede Gas Light Company, of St. Louis, Mo., recently submitted to the Municipal Assembly of that city the following proposition:

In consideration of a grant, giving them the exclusive privilege to manufacture and sell gas to the city, in the district now supplied by them, and a guarantee that their stockholders shall receive an annual dividend of 8 per cent., they will agree that the Mayor and City Comptroller shall be perpetually ex-officio members of the Board of Directors, with the same powers and right to vote as other members of the Board; and that the company will further bind itself to make to the city, annually, a sworn statement of its earnings, expenditures and profits, and that all the net profits, over 8 per cent., shall be paid into the city treasury.

[OFFICIAL REPORT.—Continued from page 225.]

## Eleventh Annual Meeting of the American Gas Light Association.

HELD AT TEUTONIA HALL, NEW YORK CITY, OCTOBER 17 and 18.

MORNING SESSION—OCTOBER 18.

Mr. Stiness (Chairman of the committee on the place of holding the next meeting)—I am directed, by the committee upon the selection of the place for holding the next annual meeting of the American Gas Light Association, to report that they are unanimously in favor of the city of Washington, D. C. I may be permitted to say, in this connection, that while there are many reasons which have guided them in their selection of the city of Washington, there is an additional reason, that one who was for many years, in the true sense of the word, an active member of the Association, resides in Washington; but who, by the dispensation of Divine Providence, may never be permitted to meet again with us unless the Association should hold its meeting in his own immediate vicinity; and the committee feel that while it would be a pleasure to have the Association meet in the city of Washington, it would also be a merited compliment to one who has adorned his profession as few other men in this country have done. Therefore, and for those reasons, the committee were unanimous in the selection of the city of Washington as the place for holding the next annual meeting. And it is most earnestly hoped that some member of this Association who is a personal friend of our distinguished frater, Mr. George A. McIlhenny, of Washington, will express to him the fact that it is the earnest desire of the Association that he will take no active part in any of the arrangements necessary to be made for the meeting, but will remain perfectly passive; and that the Association will esteem it as a privilege to them to meet with him, and to make the arrangements entirely outside of and beyond him. (Applause.)

On motion the report of the committee was unanimously adopted.

The President—Mr. Goodwin will now favor us with a paper.

Mr. Goodwin—Mr. President and Members of the American Gas Light Association: It is with my usual modesty that I appear before you, and assure you that it is with extreme delicacy of feeling that I approach the subject upon which I am about to speak. I must ask pardon, before reading the paper which I have prepared, for making a few personal allusions to myself which are, I think, due to the Association. I do not appear before you as a chemist, or as a scientist. I appear before you as a plain, practical man, who has acquired the little information that he has got, upon the subject that he is to speak to, by sheer hard work. It is within a few months of forty years since I commenced the race of life, by earning my own livelihood, and, of that period, thirty-three years have been spent in the gas profession, excepting a few years in which I was engaged with a few other persons in trying to whip such good men as our worthy president, who was on one side of the question, and I was on the other. I allude to the recent unpleasantness. Let us shake hands, Mr. President, over the bloody chasm, for that question is settled. As a poor boy, commencing life with but little education, I found that it was necessary, if I wished to get along in the world, to know something. The first few pennies that I received (and to the time that I was twenty years old I had but about a dollar per week for spending money) I invested in books, and in buying little pieces of apparatus in order to try to learn something. The first book I bought was called a diary; and the first words that I wrote in it, after writing, "The property of William W. Goodwin," were "Knowledge is power." "My son, get wisdom; but with all thy gettings, get understanding." Thus through life I have endeavored to master, as far as my ability would permit, the different subjects that I have had occasion to have my attention called to, or into which my business took me. Therefore I make no pretensions to being, as some good friends in the room call me every time they meet me, a "Professor." With these few remarks, I beg to call your attention to the subject upon which I am now to speak.

### THE PROPER COMBUSTION OF GAS.

Having been asked to say something in the interest of gas consumption, it has occurred to me that I might make a few remarks connected with the subject of the proper combustion of gas for heating and cooking purposes, and the practical problem of the conversion of heat into mechanical work. I do not propose, however, to enter into a strictly scientific discussion of the subject, but rather to present a few facts connected with the question, and which cannot be ignored or passed over lightly if we desire to master the subject—viz., the means of obtaining the largest quantity of heat from gas.

We know, scientifically, that carburetted hydrogen and the other compounds of carbon require given quantities of atmospheric air to effect their combustion; yet it seems to me we neglect to adopt the means, practically, of ascertaining what quantities are supplied, and treat them as though no such proportion were necessary. We know the proportions in which the atmospheric constituents are combined, yet we neglect the fact, and appear wholly indifferent to the distinct nature of their effects in combustion. We know that the inflammable gases are combustible only in proportion to the

degree of mixture and union which is effected between them and the oxygen of the atmosphere, yet we neglect to examine or trouble ourselves as to whether the necessary mixture has been effected or not. This should not be; more attention must be given to this subject, if we would realize the best attainable results. And this can only be accomplished by a sounder and more scientific knowledge of the question, to be only acquired by greater attention to the chemistry of the subject.

The main constituents of bituminous coal are carbon and hydrogen. In the natural state of coal these elements are united and solid. The leading distinction is that the bituminous portion is convertible to the purposes of heat in the gaseous form alone. The carbonaceous portion is combustible only in the solid state. Neither can be consumed while they remain united.

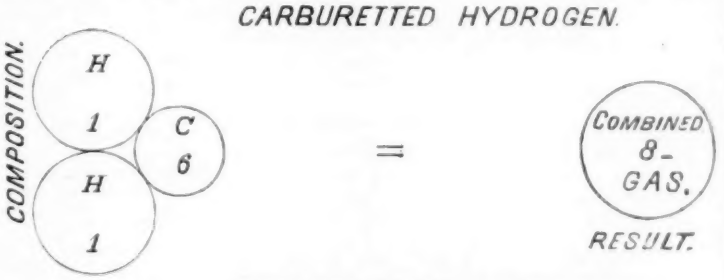
When the heat is applied to bituminous coal, it absorbs it, gas being generated, the carbonaceous or coke part remaining behind. I now propose to show, in as brief a manner as I can, the processes incident to the proper combustion of the gaseous portion of the coal.

Among the results of the application of heat to the coal in the retorts is carburetted and bi-carburetted hydrogen, or olefiant gas, these being known as combustible gases. In order to consume them there must be a supporter, and which we call oxygen; in order to effect combustion, there must be a chemical union of these gases. Coal gas, not being inflammable of itself, cannot produce flame nor cause the continuance of flame in other bodies.

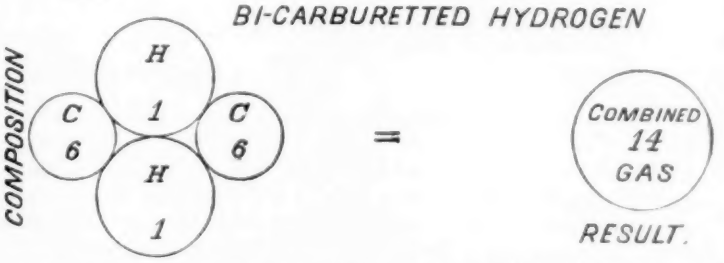
The first step, therefore, is to ascertain the quantity of oxygen with which these gases will chemically combine, and the quantity of air required for supplying such measure of oxygen. An atom of hydrogen is double the volume of an atom of carbon vapor, yet carbon is six times the weight of hydrogen; an atom of hydrogen is double the bulk of an atom of oxygen, yet the latter is eight times heavier than the former. Of the constituents of atmospheric air—nitrogen and oxygen—the volume of the former is double the volume of the latter, yet, in weight, it is 14 to 8.

If we represent the atoms of these gases by diagrams, it will help to illustrate the subject. Carburetted hydrogen consists of 2 volumes of hydrogen and 1 of carbon vapor, the gross bulk of these 3 atoms being condensed into the volume of a single atom of hydrogen, or two-fifths of their previous bulk.

CARBURETTED HYDROGEN.




BI-CARBURETTED HYDROGEN




Here we have bi-carburetted hydrogen, which consists of 2 volumes of hydrogen and 2 volumes of carbon.

The air being composed of 2 atoms of nitrogen and 1 atom of oxygen—each of the former being double the volume of one of the latter—the gross volume of the nitrogen will be 4 times that of the oxygen, and, in weight, 28 to 8; thus—

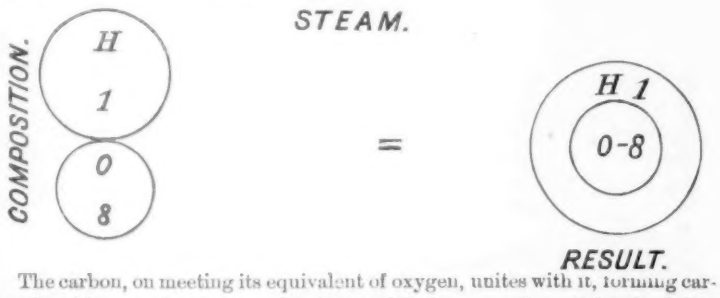
ATMOSPHERIC AIR.

As the constituents of air are not condensed, we consequently find that, in volume, we have 80 per cent. of nitrogen and 20 per cent. of oxygen.

Our next step is to ascertain the separate quantity of oxygen required by each of the constituents of the gas in order to effect perfect combustion.

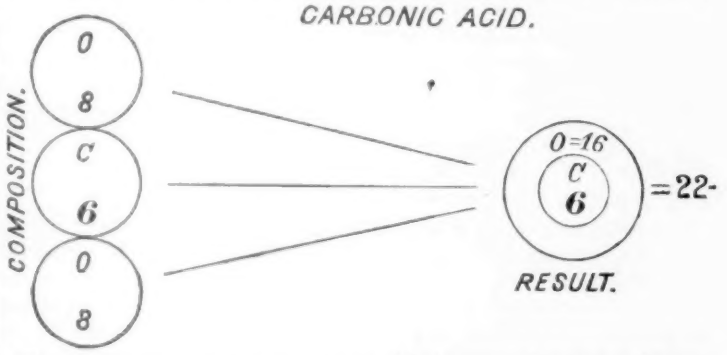
The laws of nature are fixed and immutable. One of these laws is that bodies combine only in certain fixed proportions. We find on lighting the gas, when properly mixed with air, that the hydrogen separates from the carbon and forms a union with the oxygen, producing steam; the combining volumes being 8 of oxygen to 1 of hydrogen, and the bulk being two-thirds of the volume of both taken together.

STEAM.




The carbon, on meeting its equivalent of oxygen, unites with it, forming carbonic acid gas—viz., 1 atom of carbon and 2 of oxygen (by weight, $O_{16}+C_6$).

CARBONIC ACID.

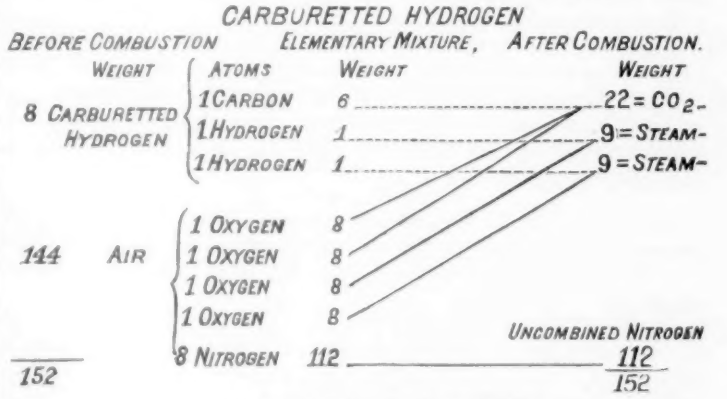



Thus is proved the fact that one atom of hydrogen and one atom of oxygen (the former being double the volume of the latter) unite to form water, and one atom of carbon and two of oxygen (the latter being double the volume of the former) unite to form carbonic acid.

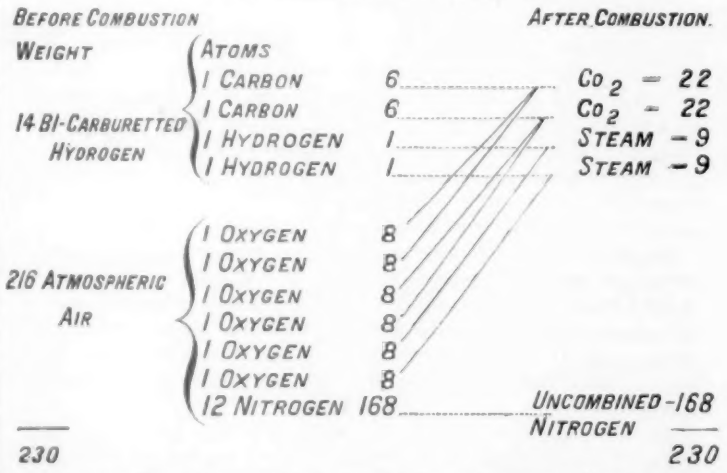
The next question to be decided is the quantity of air required to supply this quantity of oxygen. As the atmosphere contains but one-fifth in volume of oxygen, five volumes of air will be required to produce one volume of oxygen; and, as two volumes of oxygen are required for each volume of the coal gas, we must provide ten volumes of air.

The proportion of air for the combustion of bi-carburetted hydrogen, or olefiant gas, is necessarily larger than for the carburetted hydrogen.

CARBURETTED HYDROGEN

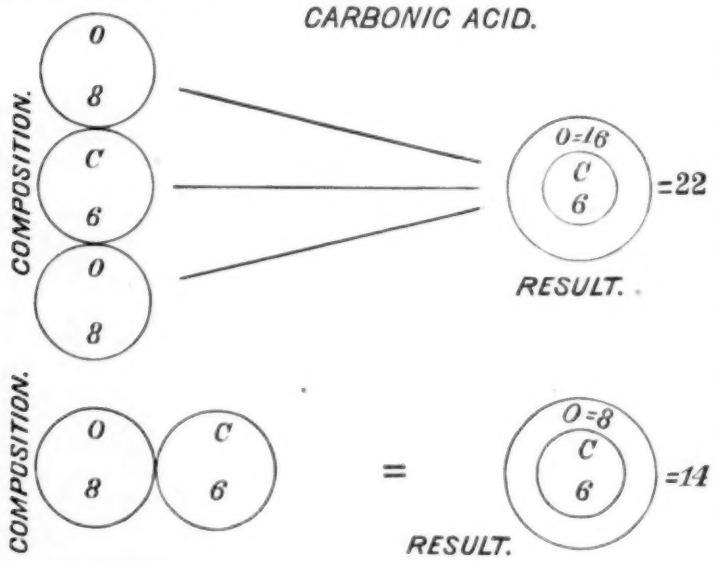



BI-CARBURETTED HYDROGEN.




Carbon is susceptible of uniting with oxygen in two proportions, by which two distinct bodies are formed—viz., carbonic acid and carbonic oxide.

Carbonic oxide contains but one-half the quantity of oxygen, yet its bulk is the same as carbonic acid; thus—




If a sufficient quantity of air is not secured to resolve the entire quantity of gas into steam and carbonic acid, carbonic oxide will be a part of the product of combustion, and the result will be detrimental to a proper combustion of gas for heating and cooking, as well as for mechanical purposes; whereas, if we can attain a perfect combustion or chemical union, the best possible results will be attained.

To this end the gas stove manufacturers and gas engine builders must turn their attention if they desire to accomplish this most desirable result. In determining which mode is the best for consuming gas for heating and cooking, as well as for mechanical purposes, there must be a standard, as there is in determining the candle power or correct registration of gas consumed. This standard is called the unit of heat, and is the amount of heat required to raise the temperature of one pound of water (at 32 degrees) one degree Fahrenheit.

It has been found that to produce a unit of heat requires 772 foot pounds, or 772 pounds falling one foot; this is termed the mechanical equivalent of heat; consequently one unit of heat should be capable of doing 772 foot pounds of work.

It has been determined, by careful experiment, that one cubic foot of coal gas can develop 696 heat units. Adopting this figure as the standard, the efficiency of the different forms of gas stoves, and the various kinds of burners used for purposes of heating and cooking, can be determined, and the question settled as to the best form of burner for roasting, broiling, and oven purposes.

*Gas Engines.*

With reference to the most efficient manner of using gas for mechanical purposes, or the production of power as developed by the use of gas engines, it seems to be a well settled fact that the only correct mode is by compressing the gas before ignition.

Mr. Dugald Clerk recently prepared and read a paper before the Institution of Civil Engineers, of England, which has been thought of sufficient merit to be noticed by the War Department of the United States in Ordinance Notes No. 230, October 21, 1882.

In the paper referred to Mr. Clerk discusses the merits of three types of gas engines. The first type is an engine drawing into its cylinder gas and air at atmospheric pressure for a portion of the stroke, cutting off communication with the outer atmosphere, and immediately igniting the mixture, the piston being pushed forward by the pressure of the ignited gases during the remainder of its stroke. The in-stroke discharges the products of combustion. This type is illustrated by the Bisschop, Turner, Sombart (which is a copy of Bisschop's) and other engines of like character. In a recent trial I found a 1-man power Bisschop engine required 18 cubic feet of gas to develop that power—equal to about 90 feet per horse power.

The third type of engine is one in which a mixture of gas and air is compressed, or introduced under compression, into a cylinder, or space at the end of a cylinder, and then ignited while the volume remains constant and the pressure rises. Under this pressure the piston moves forward, and the return stroke discharges the exhaust. Types one and three are explosive engines, the volume of the mixture remaining constant while the pressure increases.

Mr. Clerk, in the course of his experiments, has found that 1,537° C. (2,766° F.) is the temperature usually attained by the ignited gases of his engines, and accordingly has investigated the behavior of air under different conditions at this temperature.

Mr. Clerk asks: "Suppose an engine to have a piston area of 144 square inches, and a stroke of 2 feet, let the piston move through half of its stroke, drawing into the cylinder air; let enough heat be immediately added to this air to cause it to rise instantly to 1,537° C., and the piston moving forward under the pressure produced, if there be no loss of heat through the cold sides of the cylinder, but the temperature of the air fall only through performing work, how much work would be done when the piston completes its out-stroke?"

The following are the results, as stated by Mr. Clerk:

| | |
|---|---|
| 1 cubic foot of air remaining at constant volume requires, to heat it to 1,537° C., an amount of heat equivalent to | 26,762 foot pounds. |
| Maximum pressure, in pounds, per square inch above the atmosphere | 76.6 pounds. |
| Pressure at end of stroke per square inch above the atmosphere | 19.6 pounds. |
| Mean pressure during available part of stroke | 39.8 pounds. |
| Temperature of air at end of stroke | 1,089° C. |
| Work done on piston | 5,731 foot pounds. |

$$\text{Duty of engine, } \frac{5{,}731}{26{,}762} = 0.21.$$

As the engine is supposed to draw in air for half of its stroke, the last half of the stroke only is utilized for power; the mean available pressure, calculated for the whole stroke, is only

$$\frac{39.8}{2} = 19.9 \text{ per square inch.}$$

Type three.—Suppose an engine to draw into a pump one cubic foot of air; on its return stroke force into a reservoir 40 pounds above the atmosphere; the motor piston is now at the beginning of its out-stroke, and as it moves forward air from the reservoir enters the cylinder, while the piston sweeps through 0.39 cubic feet. At this point communication is cut off, and the temperature suddenly raised to 1,527° C. Hitherto the air has remained at the temperature of compression—150¼°. The pressure goes straight up to 230 pounds above the atmosphere. The piston continues to move forward, and the air expands doing work. At the end of the stroke the pressure has fallen to 8.4 pounds per square inch above the atmosphere.

The following are the results:

| | |
|---|---|
| 1 cubic foot of air at constant volume requires, to heat it from the temperature of compression (150¼°) to 1,537° C., heat equivalent to | 24,416 foot pounds. |
| Maximum pressure, in pounds per square inch above atmosphere | 220 pounds. |
| Pressure at the end of stroke | 8.4 pounds. |
| Mean pressure during available part of stroke | 47.8 pounds. |
| Temperature at middle of stroke | 953° C. |
| Temperature at end of stroke | 648° C. |
| Work done on the piston | 11,090 foot pounds. |

$$\text{Duty of engine, } \frac{11{,}090}{24{,}416} = 0.45.$$

In the most important modification of this type of engine, instead of a separate reservoir, a space is left at the end of the cylinder, into which the piston does not enter; and in this space the gases forming the inflammable mixture are compressed. The rise in pressure, therefore, commences at the beginning of the stroke, instead of when the piston has traveled out.

Comparing the results obtained from the three modes, under precisely similar conditions, the same weight of air heated to the same degree, and used in cylinders of identical capacity, there is considerable difference in the results possible, even under the purely theoretical conditions stated. The relative work obtained from one cubic foot of air heated to the assumed temperature is as follows:

Type 1.— 5,731 foot pounds work obtained = 0.21 duty.
" 2.—11,759 " " " = 0.36 "
" 3.—11,090 " " " = 0.45 "

I have omitted type 2, in which the maximum pressure in pounds per square inch above atmosphere was 76.6. The work done on piston was 11,759 foot pounds, which, divided by 32,723 foot pounds, gives the duty of 0.36.

The result is that in an engine of type 1, if 100 heat units be used, 21 units will be converted into mechanical work; in type 2, with the same amount of heat, 36 units will be given as work; and in type 3, no less than 45 units would be converted into work.

The great advantage of compression over no compression is clearly seen by the simple operation of compressing before heating. The last type of engine gives, for the same expenditure of heat, 2.1 times as much more work as the first. Compression as used by the second type does not afford so favorable a result; but even then the advantage is apparent, 1.6 times the effect being

produced. By a greater degree of compression before heating, even better results are possible. What compression does is to enable a great fall of temperature to be obtained due to work done with but a small movement of the piston. In type 1, when the piston has reached the end of its stroke, the increase from the moment of ignition is only from 1 volume to 2 volumes, while in type 3, with the same total volume swept by the piston, it increases from 1 to 5 volumes. In the one case the ratio of expansion is 2, while in the other it is 5. In type 1 the mean available pressure over the whole stroke is nearly 20 pounds per square inch. The compression in the Clerk engine is at least 40 pounds per square inch above the atmosphere.

Mr. Clerk (from whose paper I am quoting largely) states that, taking all circumstances into consideration, it is certainly not overestimating the relative advantage of the compression engine to say that it will, under practical conditions, give, for a certain amount of heat, three times the work it is possible to get from the engine under no compression.

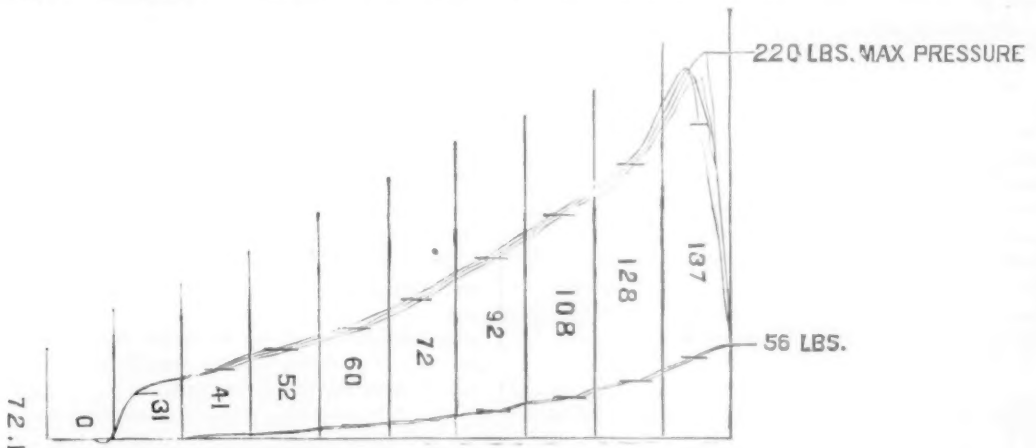
The amount of gas consumed by the three types of engines hitherto in practice is about as follows:

Type 1.—95 cubic feet per indicated horse power per hour.

Type 2.—(Brayton) 50 cubic feet per indicated horse power per hour.

Type 3.—22 cubic feet per indicated horse power per hour.

The accompanying figure represents a diagram from one of the Clerk engines, which belongs to type 3. Indicated horse power, 12¼; average pressure, 72 pounds; maximum pressure, 220 pounds; pressure before ignition, 56 pounds; revolutions, 154; diameter of cylinder, 7 inches; length of stroke, 12 inches; consumption of gas, 20.7 cubic feet per indicated horse power per hour.




In order to obtain the best results in the shape of mechanical work from a gas engine, it is very important that the mixture of gas and air should be in proper proportion. In exploding different mixtures of marsh gas and air, the following results have been obtained:

Marsh gas 1 volume, air 5 volumes.—Passing the electric spark through the mixture, no effect is produced.

Marsh gas 1 volume, air 6 volumes.—Explosion only occurs in a succession of shocks; this is the first limit of possible explosion, marsh gas being in excess.

Marsh gas 1 volume, and 7, 8, and 9 volumes of air, gave a sharp explosion; with 12, 13, 14, and 15 volumes of air for 1 volume of marsh gas, explosion occurs, but grows gradually weaker; with 16 volumes of air, the effect is reduced to a series of slight intermittent commotions. This is the second limit; the air is in excess.

In the Clerk engine, calculating from the moment when the ignition port is opening to the flame to the moment of maximum pressure as represented in the diagram, it has been ascertained that the time occupied is an average of 1-25th of a second. The time taken to attain maximum pressure is longer in a large engine than in a small one, because the distance through which the flame has to travel is greater. Professor Bunsen, during a series of tests to determine the celerity of the propagation of ignition through a pure explosive mixture of hydrogen and oxygen, found the rate of the propagation to be 34 meters per second, or about 110 feet. In a maximum explosive mixture of carbonic oxide and oxygen, it was not quite 1 meter, or 39 inches per second. It has been found that the maximum rate of propagation of ignition through a mixture of 1 volume of coal gas with 5 volumes of air to be 1.01 meter per second. One volume of coal gas with 6½ volumes of air gave a rate of 0.285 meters, or 11 inches, per second. This is the rate of ignition at constant pressure; in a closed tube fired at one end it would ignite with much greater rapidity.

Mr. Clerk found it possible to ignite a whole mass in any given time between the limits of 1-10th and 1-100th part of a second by so arranging the plan of ignition that a small volume of gaseous mixture is first ignited, expanding and projecting a flame through a passage into the mass of inflammable mixture, and thus adding to the rate of ignition the mechanical disturbance produced by the entering flame. He has succeeded by this means in producing maximum pressure in 1-100th part of a second in a space containing 200 cubic inches. This rate of ignition, however, is too rapid, and would not give the engine time to take up the slack in bearings, connecting rods, etc.; but by firing a mixture with varying amounts of mechanical disturbance, almost any time of ignition can be obtained between 1-100th and 1-10th of a second. It does not matter whether the mixture used is rich or weak gas; the rich mixture can be fired slowly and the weak one rapidly, just as may be required. The rate of ignition of the strongest possible mixture is so slow that the time of attaining complete inflammation depends upon the amount of mechanical disturbance permitted.

It will be seen from the foregoing that without compression before ignition an engine cannot be produced giving power economically and with small bulk. The mixture used may be diluted, air may be introduced in front of gas and air, or an elaborate system of stratification may be adopted, but without compression no good effect will be produced. This is the great advance over the old system; the greater the compression before ignition the more rapid will be the transformation of heat into work by a given movement of the piston after ignition. The greatest loss in the gas engine is that of heat through the sides of the cylinder; and this is not astonishing when the high temperature of the flame in the cylinder is considered. In larger engines using greater compression and greater expansion it will be much reduced. As an engine increases in size the volume of gaseous mixture used increases as the cube, while the surface exposed only increases as the square, so that the proportion of volume of gaseous mixture used to surface cooling is less the larger the engine becomes.

Mr. Clerk states that, taking these facts into consideration, it may be accepted as probable that an engine of about 50 indicated horse power could be made to work on 12 cubic feet of coal gas per indicated horse power per hour, or a duty of about 32 per cent. The gas engine is yet in its infancy, but it can and will be made as manageable as the steam engine in by no means a remote future. The time will come when factories, railways, and even ships, will be driven by gas engines as efficient as an any steam engine, and much more safe and economical of fuel. Gas generators will replace steam boilers, and power will not be stored up in enormous reservoirs, but be generated direct from the coal required by the engine.

Mr. President, in thanking the Association (which I now do) for their kind attention in listening to my remarks, I have to say that when I commenced the preparation of this paper I had no idea of extending it to its present length; but when I came to consider the question of the proper combustion of gas for mechanical work as developed by the gas engine, and as the subject was so new, I have been led to quote more largely from Mr. Clerk's paper on the theory of the gas engine than I at first intended. I again thank you for your kind attention.

*Discussion.*

Mr. M. S. Greenough—We have listened with a good deal of interest to Mr. Goodwin's paper on the subject of the combustion of gases; but, of course, it is a paper which it is impossible for us to carry away in our heads. The value of it will be better appreciated, and it will be more valuable to us for the purposes of reference than it can be for discussion at the present time. A question, however, which interests us all is this matter of gas engines. There is one question which I wish to ask Mr. Goodwin in that connection, and the question is perhaps more of a practical than of a theoretical nature. The only engine which I know of in use in this country to any extent is the Otto engine. I noticed Mr. Goodwin spoke of that as requiring 22½ feet of gas per hour per indicated horse power; and he says that

the Clerk engine, of moderate power, requires 20.7 feet, or 10 per cent. less than the Otto engine. The people in our part of the country who have introduced the Otto engine have been very much pleased with the working of it; but they have found a great difficulty in its general introduction because of the impossibility of procuring them readily, and also because of the large cost. I wish to ask Mr. Goodwin whether there is any probability of the Clerk engine being introduced into this country within a reasonable time, and what will be the cost of the Clerk engine as compared with that of the Otto engine?

Mr. Goodwin—In order to answer that question I shall have to be again somewhat personal. I have endeavored, in my paper, to avoid all questions of business. It is a difficult matter for a man situated as I am in the business to avoid some reference to it. I had rather hoped that that question would not be asked me, as I did not want to make a public statement before the Association; but I think, under the circumstances in which the question is presented, the members will excuse me if I am compelled to bring in the shop in answering it. Several gentlemen, myself among the number, have acquired the right to manufacture the Clerk gas engine in this country, for which we paid a very large sum of money—amounting to tens of thousands of dollars in hard cash—before we commenced to do anything in the direction of manufacture. Two years ago last September, while in Paris, I came across this engine. I make this explanation by way of apology, because, a year ago, I promised to have the engines ready within three months. I then made an arrangement to get control of the manufacture of the engine in this country. Before we got a trial of the engine a year and four months passed, simply because of delay in consummating the arrangement. It became necessary, before the matter could be concluded, that Mr. Sterne should come to this country; and we found it necessary to enter into long negotiations. As our English friends are sometimes slower than their Yankee brethren, we were greatly delayed in getting the matter satisfactorily arranged. After becoming possessed of the right to manufacture them, the question arose as to the best way to go about it. Such gentlemen as Mr. Merrick and our lamented late President, Mr. Price, and two or three other gentlemen in this room, became interested with me in the company which has secured the right to introduce the engine into this country. The gentlemen who are here are so modest that I will not mention their names. We went into this thing with the determination to get out an engine inside of three months. I will say to you that we spent tens of thousands of dollars to accomplish our purpose; in fact, money was no object to us. We selected, out of several parties who were ready to take the manufacture of the machines, two of the largest establishments in this country, and we gave them a contract covering several hundred engines. These houses are first-class, one of them having at least $2,000,000 capital, and the other having more than that invested in their business. I state that fact to give you an idea of their capacity and ability to successfully carry out a contract of this kind. I have the pleasure of saying that you can see an engine in operation at the fair of the American Institute. We hope that within two months the Clerk gas engine will be ready to be furnished, to those who order it, by this company. With reference to the amount of gas consumed, I speak of this particular engine, No. 108, which uses an average of 20.71 feet of gas per hour per indicated horse power. That is one of the best cards we ever got from it, and I therefore show it to you. It shows what American skill may be able to accomplish. I do not wish to be understood as saying one unkind word against any other engine, and particularly against the engine in this country, of the third type, of which Mr. Greenough has spoken. The gentlemen who have introduced that engine deserve a vast deal of credit for their energy and efforts to produce a good engine. The difference however, between the Clerk and the Otto engine is this—that the Otto engine takes gas and produces work only on every other stroke. We will suppose that the charge is in here [referring to diagram]; then the explosion takes place. Here is an indicator card, taken from engine No. 270, of the Otto type, under a pressure of 28 pounds, and with a maximum pressure of 125 pounds. Now, when the explosion takes place, the piston is driven out. There being no exhaust port in that engine, on the return of the piston the products of combustion pass out at the rear. It then takes in another charge, and the piston is carried on by the momentum of the flywheel; as it returns, it then compresses the gas, and, on the next revolution, the explosion takes place. In the Clerk gas engine, with every stroke you get combustion and power. As it reaches that point [referring to the diagram] the exhaust takes place. I do not undertake to say that the Clerk gas engine will use less gas than the Otto; not by any means. But there is the indicator card, and that is the result. That card is one of the best that we have obtained. We have had later and better results in England than those which I have given you. The price at which the Clerk gas engine will be furnished is a subject which has agitated our minds very considerably. We are, of course, all human; and, of course, we want to make the most that we can out of it. But, at the same time, as a gas man, I realize the necessity of placing an engine, in which I have an interest, before the community, which will not only do the work required, but which can be put upon the market at a moderate price. Our engine will not cost more than the Otto, and it may cost less. How much less I am not prepared to say to-day. If you have been satisfied with the prices which you have been paying for the Otto engine, I think you will be satisfied with the price which you will have to pay for the Clerk engine. The great difficulty in starting all the engines of the third type, like the Otto and the Clerk, is to get up a momentum. It was a very demoralizing sight, the first time I saw one of the large engines, to see four men on the flywheel pushing and pulling, in order to get up the necessary momentum to start it. I said at once there must be a stop to that. The last time Mr. Sterne was in this country we talked over the matter, and a letter received by the last mail, a few days since, states that the difficulty has been overcome by a new device, and that the wife of one of the superintendents was able, without other assistance, to start a 25-horse power engine. So I infer that the plan which I suggested for overcoming the difficulty, which to me seemed a very serious one, has proved a success.

Mr. Greenough—In asking Mr. Goodwin the question with regard to the Clerk engine, I had entirely forgotten that he was in any way connected with the introduction of it into this country, and had no intention of putting him in an unpleasant position.

Mr. Goodwin—You need not apologize; I am pleased that you gave me an opportunity to make the statement.

Mr. Greenough—I am glad that Mr. Goodwin and other energetic gentlemen like him have taken hold of this thing. I think that for a gas engine of moderate cost there is a very large field in this country; but if the gentlemen connected with the gas engine business seek to make their profits too rapidly, I fear that they will not be so successful in introducing the engines to public favor as they would be if they sought only a fair return on the amount of capital invested. I have long been of the opinion that the man who should invent a successful gas engine had a large fortune before him; and as soon as it is put upon the market I have no doubt there will be an extensive demand.

Mr. Stedman—When the combustion is at the further end of the stroke, and the explosion has been accomplished, and the port is opened so that the compressed gases are discharged, what kind of gas then remains in the cylinder?

Mr. Goodwin—I will try to explain what takes places during one stroke, and that will probably answer your question. When the combustion has reached about this point, [referring to the diagram] and the compression cylinder alongside of the engine has received into it a charge of gas and air through a certain length of stroke, after it has reached that certain length the gas is cut off, and the air continues to enter. The piston has now reached the end of its stroke, and has commenced to return; and at this end the valve remains closed, because the pressure in here is greater than it is there. It is about 2 pounds here and it is about 41 pounds up there. So that, the moment the port is uncovered by the piston, and the pressure (which is 31 pounds at the moment it opens) drops. The instant this takes place the valve at this end opens, and, of course, in a very small fraction of a second, the piston, having returned part way, the turn of the crank has made a compression of several pounds; the intant it is released, the valve, working, lifts, and a current of air shoots through sweeping any of the products of combustion which had been left in the cylinder through the exhaust port. But before the gas reaches it, the piston has returned and covered the port. Then, of course, it begins to compress, and as the pressure goes up the valve closes, and there is no further communication, but the gas is going into the cylinder, and getting ready for the next explosion. Does that answer the question?

Mr. Stedman—Entirely. That shows how ingenious the process is for getting clear of the burning gas, and not having it contaminate the compressed air which comes in on the next charge.

Mr. Goodwin—You will observe that the air rushes in ahead of the gas, but before the gas reaches the port it is calculated that the piston will have come back and closed the same.

Mr. Vanderpool—I would like to ask Mr. Goodwin whether there is likely to be any question of infringement raised between the makers of the Otto and Clerk engines, or whether these questions have been settled. It is a matter which will interest some of us who expect to buy the engines.

Mr. Goodwin—And it is a question which interests us. I will say, in reply, that people are known by their works. We have placed a large amount of money in the manufacture of these engines, and we further think we have the nerve and pluck to try that issue with anybody whenever it comes up. As to the question of infringement, that is something which I cannot answer; but I will make a little further explanation since this question draws out another fact. I do not wish to take up too much of the time of the Association with questions, and with explanations, but as the question has been asked me it only remains for me to answer. It is claimed that they have in the Otto engine what they call a "stratification;" and that the nearer you get to the piston, the nearer you are to pure air, and that the

nearer you get to the back part of the explosive mixture, the more gas you have. Their claim, as I understand it, is as to the stratification of the gases; and that there is a cushion of nearly pure air right at the back of that piston. We have had some of the highest legal authority in this country, as well as in England, to examine this claim for us, and to determine the question practically Mr. Clerk and Professor Thompson entered into a series of experiments. They drilled a hole in the cylinder, inserted a tube, and in that tube they put a valve, worked by a spring, which was connected with the connecting rod, and so arranged that they could take portions of the gas at any part of the stroke. They so timed it that, as the piston was just reaching the periphery of the tube, the valve would be open and the gas that was there, right at that point, would be forced up into that tube and then shut off by the spring. Therefore, they would have in that receptacle a charge of the gas which was immediately behind the piston. By this means they were enabled to prove that instead of its being a stratification, it was a perfect mixture all through the cylinder. As we understand it, their claim is stratification; and this experiment establishes the fact that there is none.

Mr. Vanderpool—I understand that, in the case of Otto *versus* Linford, the English Court of Chancery decided in favor of Linford. This case was appealed, and the Supreme Court decided in favor of Otto, principally because Otto claimed, and appeared, to obtain his power and gradual expansion in his cylinders by means of a stratified mixture of gas, air, and the products of combustion ignited under compression. I am now told that in the Otto engine, as a matter of fact, the gases are not stratified, but the mixture of air, gas, and the products of combustion is complete at the time of ignition. But, in addition, a claim was made by Otto, but its validity was not determined by the court, which covered the mode of compressing the mixture—that is to say, the compression of the charge by means of the back stroke of the piston. It is this latter claim which some think to be so broad that its support by the courts would virtually prevent the building of cheap, uncomplicated, and economical gas engines.

Mr. Goodwin—In answer to this, I can only say that we must wait to be attacked, and if that question is raised, it must be decided by a court.

Mr. Vanderpool—But suppose that we purchase ten, fifteen, or twenty engines, or induce our consumers to purchase them; where is our protection if other makers should attempt to stop the use of the engines on the pretense that they are an infringement on their make.

Mr. Goodwin—I am not a member of the legal profession, and I cannot answer the legal bearing of that question. Of course, those are vital ones to us. We have given to them considerable thought and attention. We obtained legal opinions upon the subject before we ever went into this thing, and the fact that we have given out contracts to a large amount indicates our reliance upon, and our faith in, the opinions which we received.

Mr. Vanderpool—Do those opinions cover the question with reference to the stratification of the gas, and also with reference to the compression of the charge. I understand the latter to be the main thing that they now urge; and they have given up this stratification feature because it did not really take place.

Mr. Goodwin—As I have said, I cannot tell what they will do.

The President—Has not the Clerk engine been manufactured and used in England for some time?

Mr. Goodwin—The Clerk engine has been manufactured in England, and, to-day, it is working alongside of, or next door to, the Otto. The two companies have offices very near each other. Our people on the other side of the water have repeatedly courted an investigation of this question; and have sought to have it raised; and have stood ready to respond to any litigation that might grow out of it. But, as I have said, the best authority we have been able to obtain on the other side, and this, confirms us in the opinion which we have formed, that there is no danger from an infringement. Of course I cannot say what these people may do. We often hear little mutterings to which we pay no attention. We are ready to meet the question whenever they wish to raise it. We have had the nerve to go into this thing, to put our money into it, to build these engines, and if you will have the confidence to give us a reasonable amount of orders by way of encouragement we will take care of anything in the direction of a law suit.

### FIXING SALARY OF SECRETARY AND TREASURER.

Mr. Sherman—(Chairman of the committee on nominations)—Before making the report of this committee, I would like to bring a matter before the Association. I would like to ask on what grounds they raised the salary of the Secretary and Treasurer from $300 to $500. Unless there are some reasons which are apparent to those outside of the committee, I am not alone in thinking that the price named is too much. We all favor paying the Secretary a fair price for the services rendered, but we do not favor making the price so high that the office will be sought for because of its emoluments. In order to bring out an expression of opinion upon this subject I now move that the vote of yesterday which fixed the salary of the Secretary at $500 per year be reconsidered, and that the salary be fixed at $350.

The President—Before putting the question on this motion, I will state, as Chairman of the Executive Committee, that it was the sense of a majority of the committee that the price now paid to the Secretary was not a sufficient remuneration for the time and service required to properly fulfill the duties of the office; that our membership was increasing so rapidily that the Secretary must, in future, spend more of his time in properly attending to his duties than has heretofore been necessary. It was the idea of the committee that the Association would probably open an office in the city of New York to which all gas men might resort whenever they visited the city; and that we should there have a man always ready to receive members; and that this duty would probably, devolve upon the Secretary; and the increased membership would render necessary a more extensive correspondence. The committee thought that the sum of $500 was not too much to pay to a proper man to fill that position. The matter was discussed, and the resolution upon which the Association has acted was an expression of the sense of the committee. But, at the same time, the committee had no intention of imposing its own ideas upon the Association. The matter was laid before the Association yesterday and the recommendation was adopted. As our attendance to-day is much larger than it was yesterday, it is quite proper that the question should come up for reconsideration.

Mr. Graeff—I move to lay the motion to reconsider upon the table.

Mr. Denniston—That would cut off all debate, would it not?

Mr. Graeff—Yes; but while it cuts off all debate those who wish debate can vote against laying the motion upon the table. Of course if my motion is not carried, then the motion to reconsider comes up.

The motion of Mr. Graeff to lay the motion to reconsider on the table was lost.

Mr. Denniston—I did not intend to say anything upon this subject, but I would like to know what the other members have to say. The statement of Mr. Sherman yesterday indicated that, in the opinion of the Executive Committee, there should be an increase of salary; and the matter was talked about outside of the Hall. This morning I have heard different persons question the propriety of making this a position to be sought after for the sake of the money there is in it. It is true that $500 per year is not a very great salary; and yet who among us, even the most eminent of engineers, are getting at the rate of what this would pay for the actual amount of work to be done, and not only for the actual amount of work to be done, but for the proper person to do the work. There certainly is not in the work of this organization enough to consume any one man's time for a month, putting all of the work of the year together. The short-hand writer takes down everything that is said in the Convention; and when the books are to be published they are simply copied from the reports which have already been published in the American Gas Light Journal. The books having been published, a boy can sit down, and, taking the list of members, direct and distribute the books among them. Where then does the work of the Secretary come in? The money is deposited under the direction of the Finance Committee. You now have about $1,300 in bank, and at the end of this year you will have about $2,500. Although I did not expect to say anything on this subject, I have my own opinion about it; and would like to hear an expression of opinion from others. If a majority of the members think that it is proper to pay a salary of $500 I will make no opposition. But I do think, nevertheless, that $300 per year is a sufficient compensation for the work which the Secretary and Treasurer will be called upon to perform. I know that it is a little unpopular to be considered economical and parsimonious; but I should suggest that if we have too much money on hand, or are likely to accumulate too much from our present charges for membership and annual dues, then let us reduce the fees; if no one else offers such a resolution I will offer one reducing the annual dues from $5 to $3 or to $2.50. With our 300 members that will make our yearly income $900. About every second year you will have to pay $500 or $600 for the publication of the proceedings; but you will still have a good balance in hand. The suggestion has been made that the Association should have an office in the city of New York, which shall serve as a rendezvous for members who are visiting the city; but, I ask, how many gentlemen of this organization, extending, as it does, from San Francisco to Nova Scotia, and North and South, who come here would care to occupy a room, or would go there to read the books of the Association, even if you had a library in a nicely carpeted office. A few of those in this immediate vicinity might frequent the place, but the New York members already have their Association; the New England members have their Association; and the Western members have their Association. So that when we meet here we meet for the purpose of digesting the various experiences of members of the different organizations. We do not need any fancy meeting room here because there is probably not more than one-tenth portion of the members who will come here oftener than once in five years, unless you should make the place of meeting annually in the city of New York. For these reasons I support the motion, made by the gentleman from Massachusetts, to reconsider a resolution which was adopted yesterday and am in favor of maintaining the salary at the same figure

which has heretofore been paid. Let us take this action and fix the salary before the nominating committee make their report, and before we know who has been chosen for the position of Secretary. Then if the nominee does not choose to accept the office, I think there are plenty who will. Not that I advocate that the Secretary shall be asked to work for nothing, as I desire that whatever work is done shall be well paid for—that all the Secretary's expenses shall be paid, and that he shall also be paid for his attendance at the annual meeting.

The Secretary—Lest any of my friends should make a mistake in this matter, I wish it to be distinctly understood that this increase of salary is not to benefit you present secretary. It is a well-known fact that the Secretary does not desire a re-election. Although present at the meeting of the Executive Committee, in performance of my duty there as a member, I felt a delicacy, when this matter of increase of salary was pending, in opposing it, as I did not know who my successor would be, and did not wish to dictate that his salary should be more or less than mine. I desired no addition to my salary ; and if I had remained in the place should not have asked for any increase. As Mr. Nettleton, who formerly held the office, well knows, there is a great deal of work to be done in connection with the office of the Secretary. There is no boy who can edit your proceedings, as has been suggested. There is no boy who can take the printed reports of the meeting of the Association, as they appear in the AMERICAN GAS LIGHT JOURNAL, containing, as they do, more or less of the jocular remarks which are proper enough for this meeting, but which are not proper to be placed upon the permanent record of the Association, and properly revise them, and it is impossible for this Association, made up as it is of members who are scattered all over the country, to appoint a committee of revision for that work. You must have a secretary who has the ability to take the record of the proceedings, as they appear in the JOURNAL, eliminate from it all objectionable matter (in the sense that we do not wish our little jokes and pleasantries to go into a permanent record) and make up a volume which you will all feel is a credit to the Association. Every second year your secretary has an immense amount of work to do in that line—I have done it for some years, and I know what it is. I helped Mr. Nettleton, who very ably filled this office before myself, and learned, while helping him, as a member of the printing committee, that he had a great deal of work to do, and that he was very illy paid at $250 per year. Then an addition of $50 per year was made to the salary ; and I now feel that the compensation is ample for any gentleman who may fill this office at the present time. There is a sense of honor connected with it which may be considered in the light of part compensation for services rendered, because of the respect indicated by one's fellow-members in placing him there by their votes. That feeling is worth a great deal more than the salary. But do not make the mistake of supposing that there is no work to be done in this office, for there is a great deal of work ; and no man who has not been in the office knows what that work is. There is a great deal of correspondence, and for as busy a man as I have been, and as Mr. Nettleton was in his own private affairs, the duty of properly attending to the correspondence is quite a severe tax. We do not have clerks to do that work for us. It is generally done by ourselves. It is fair that the Association should consider that fact. Individually, my idea is that $300 per year is salary enough ; but do not be carried away with the idea that your Secretary has no work to do in performing the duties of his office, or that such work as is required of him can be performed by any boy.

Mr. Butterworth—As a member of the Executive Committee, I believe I introduced that resolution, having understood, from our friend Captain White, that he did not intend to offer himself as a candidate for re-election, and there would probably be a change. We now have over 300 members, and a great deal of correspondence is necessary. The preparations necessarily made for the annual meetings of the Association also occupy a good deal of time. Mr. White did not attend at Boston, and there was consequently some confusion there in getting things into proper shape. We have generally had Major Dresser to help us, and we shall now miss his valuable assistance. As we were going to make a change in the office, we thought it proper to fix the salary before the nomination was made, and before we knew to whom the increased salary was to be paid. We would then be in a position to offer the place to a first-class man at a fair compensation. It my opinion $500 is none too much. I would not like to do the work for a $1,000 a year. But still, as our friend from Pittsburgh says, it is not economy to offer $300 or $350 to a first-class Secretary of the National Association. I should like to see the man well paid, whoever he is, and whether working for us or anybody else. In this instance the amount of actual labor necessary to be performed is very large. The Secretary has to have somebody here to receive money from members, and make out the receipts. Sometimes it is necessary to have assistants to help in this work. We may be able to save hours of time in getting to work promptly the first day ; and if we can do this, and get away so much earlier and return to our business, we may be able to save for ourselves much more than the difference between the $350 and $500 which it is proposed to pay the Secretary.

The Secretary—In answer to the suggestion which has been made, that the annual dues should be reduced to $2.50 per year, I would suggest that the present charge is just about sufficient to keep the Association free of debt. The expenses of the year in which the volume is published, upon the basis of printing 600 copies and sending them out, is between $700 and $800. Of course, as the membership of the Association increases, and we continue to act upon the resolution to give two copies of the record to each member, we will, on the occasion of printing the next volume of proceedings, have to furnish 700 to 800 copies or more, to have enough additional copies printed to be able to supply new members as they may hereafter join the Association. It is, therefore, fair to consider that the expenses of the Association, outside of the salary of the Secretary, will average about $1,000 per year hereafter. It may be well to remember the fact that the Association has been a sort of a pauper heretofore. It goes from city to city ; and, in the different places, it has had balls, entertainments, and badges furnished by the gas companies, who have entertained the members. This practice has been a very bad one ; and instead of reducing the dues, as has been proposed, I would suggest that it would be better not to decrease them ; and hereafter to pay for your entertainments, as you have never done before. I think it is the more dignified course for the Association to pay for everything it has ; and the policy now seems to find favor with the members of no longer putting ourselves in the condition of chronic guests, going around from town to town, holding out our hats, and asking for entertainment. (Applause). We are now strong enough to entertain ourselves, and to pay our own bills ; and certainly any man belonging to the Association derives from it every year at least $5 worth of good, solid, information.

The President—It has been moved and seconded that the amendment adopted yesterday, increasing the salary of the Secretary to $500 per year, be rescinded, and the salary brought back to $300 per year.

Mr. Harbison—Instead of fixing it at the same figure as formerly, I think the motion should first be to reconsider, and then afterwards we can fix the salary.

Mr. Sherman—I intend to move, after reconsidering this vote, to make the salary $350.

The President—The question now is simply upon the motion to reconsider the resolution passed yesterday.

The motion to reconsider was lost.

### REPORT OF NOMINATING COMMITTEE.

Mr. Sherman—(From the Committee on the nomination of officers). The committee beg leave to present the following report :

For President, William A Stedman ; Vice-Presidents, Eugene Vanderpool, A. C. Wood, T. Butterworth ; Secretary and Treasurer, C. J. R. Humphreys ; Finance Committee, John Andrew, G. S. Hookey, William Cartwright ; Executive Committee, M. S. Greenough, Thomas Turner, M. N. Diall, William H. Pearson, C. E. Hequembourg, R. B. Dickey.

In regard to placing Mr. Pearson's name upon the list, it is proper that I should say that it was done against his wishes, he being on the nominating committee ; but as this office had been held in one place, and by one company for several years, it was thought best, by the other members of the committee, that a change should be made.

On motion of the Secretary, the report of the Committee on Nominations was unanimously adopted.

On motion of Mr. Harbison, the Secretary was instructed to cast the ballot of the Association for the nominees recommended by the committee. The President appointed Messrs. Greenough and Turner, as tellers, to receive the vote of the Association.

The Secretary having cast the ballot of the Association as directed, the tellers so reported, and the President announced that the nominees had been duly and unanimously elected officers of the Association for the next year.

Mr. Vanderpool—I think, Mr. President, that it has always been customary upon the election of a new president that he should be heard by the Association ; and I, therefore, call upon Colonel Stedman for some remarks.

Mr. Stedman (President-elect)—Mr. President, and gentlemen of the Association :—I am profoundly sensible of the honor of your election, and deeply impressed with the responsibilities of the situation. In order that I may not be overwhelmed by the disparity between my own small merit and the exalted station to which you have called me, I wish to ascribe a large share of your consideration to the credit of New England, an humble representative of which section I have the honor to be. I assure you, gentlemen, that I am deeply touched with this expression of your confidence, and I trust that neither New England nor the Association will have cause to regret your action of to-day, when I shall have fulfilled to the best of my ability the official duties which may devolve upon me. (Applause).

[To be continued.]

## An Unscrupulous Corporation.

The Standard Oil Company has attracted the attention of the public mind over and over again, owing to the unsavoriness of its operations; and now that this gigantic corporation seems to be endeavoring to extend its sway to the field of gas lighting, the gas makers of the United States should see to it that the tactics which conquered the oil-refining interests of the country be not allowed to once more prevail. Bribery, corruption, and general rottenness, if the public prints are to be believed, have marked its pathway; but the structure built upon such foundations is certain to be overturned, and the time is sure to come when the good sense of the American people will insist upon an accounting.

The New York *Times*, of November 20th, in a leading editorial, thus speaks of what it justly terms "An Unscrupulous Corporation:"

"A corporation that begins business with a capital of $1,000,000, and in thirteen years not only becomes the absolute master of the petroleum trade of the United States, but also heaps up net profits amounting to $77,100,000, and raises its capital stock to more than $70,000,000, can afford to be honest. Yet we venture to say that the story of the Standard Oil Company's dealings with E. G. Patterson, told upon the witness stand by a member of that company's executive committee, will surprise no one who knows how this great monopoly was erected upon the ruins of legitimate business enterprises which it had pitilessly crushed out of existence.

"Two years and a half ago the State of Pennsylvania undertook to collect from this company the unpaid taxes of nine years, amounting, it was estimated, to $3,145,541. The Dauphin County Court of Common Pleas decided that there was due to the State only $31,801. Appeal having been taken by both sides, the amount due was reduced by the Supreme Court to $18,289. E. G. Patterson had been employed by the Attorney-General to collect evidence to be used in the prosecution of the suit, and a committee of the Pennsylvania Legislature is now trying to find out whether, as has been asserted, the company bought Patterson by paying him $15,000, and placing him in an office that yielded him $5,000 a year. The company, established in its monopoly, without shame confesses that it did this thing.

"A commercial organization of unlimited power that accomplishes its purposes by acts like this, and by the other bargains that have made it notorious, has a demoralizing influence upon business and commerce.

"It is extending its power in many directions. It has already gained possession of the gas companies of the city of Brooklyn, by forcing them, through ruinous competition, to accept its terms. The honest people of that city, who have overthrown one municipal ring, will not only suffer in their pockets by the acts of this unscrupulous corporation, but in the course of time they will also undoubtedly discover that the power which has captured their streets will appear in local politics. It brings corruption with its gas, and nothing but ceaseless vigilance will protect the city government from its contaminating influence."

## ITEMS OF INTEREST FROM VARIOUS LOCALITIES.

Mr. Geo. A. McIlhenny Elected President of the Washington Gas Light Company.—At a meeting of the Board of Directors of the Washington Gas Light Company, held on Thursday, October 25, Mr. Henry L. Gaw, of Philadelphia, Pa., tendered his resignation as a director, and Mr. Geo. A. McIlhenny was elected to fill the vacancy thus created. At a subsequent meeting of the new board Mr. B. H. Bartol, who has filled the position of President of the Washington Company for the past 19 years, declined a re-election, and the directors then voted to place Mr. McIlhenny in the Presidential chair. The management of the Washington Gas Light Company are to be congratulated on their choice, and the gas fraternity of the country will hail with pleasure the promotion of one who has always been indefatigable in furthering the best interests of the profession, as evidenced by his course for many years as engineer and superintendent of the company of which he is now the executive head. As at present organized, the gentlemen comprising the board of directors are the following: Messrs. Geo. A. McIlhenny, B. H. Bartol, Chas. H. Rogers, William B. Riley, and William B. Webb.

Suffocated by Gas.—Francis W. Martin, a farmer, was suffocated by gas on the night of Wednesday, November 14, at Seublin's Hotel, Utica, N. Y. It is supposed that he blew the gas out upon retiring to bed.

Was it Caused by the Heating Gas?—On the morning of Saturday, November 10, nearly all the employees in the shop of George H. Batchelder & Co., 204 Union street, Lynn, Mass., were taken sick. The symptoms were similar in each case, and the cause has been attributed to inhaling the gas manufactured by the company which has succeeded to the estate of the old Lynn heating concern. A service pipe running into the Batchelder building connects with the mains of the former steam heating company. These mains are now being utilized for the supply of a cheap heating gas, generated under the Lowe process, and it is supposed that some of the joints were defective, escapes of gas being occasioned thereby. The Lynn *Item*, in noticing this occurrence, says—

"This case, following so closely upon the introduction of the gas into the mains, must naturally be attributed to the gas. An investigation has been made of the premises, but no leak has been found as yet. Another idea regarding the same has been advanced, and that is that a leak in the sewer pipes may exist. A leakage, however, in the sewer pipes, would not have such a peculiar effect. Dr. Pinkham is to make an examination of the premises and the causes leading to the sickness. City Solicitor Allen is working rigorously for the city, and the injunction will soon be filed in the Supreme Court against the company. The gas has been in the mains, and as it has such an effect, the manufacture of it certainly ought to be stopped at once."

Gas Mains Injured at Waterbury, Conn.—A portion of the street mains of the Citizens Gas Light Company, of Waterbury, Conn., were recently damaged through the negligent and careless work of a sewer contractor. The roadway had not been drained previous to the laying of the gas and water pipes; the necessity for such drainage becoming apparent, the town authorities ordered a sewer to be constructed, and, as usual, the sewer builder did not pay an unnecessary amount of attention to whatever obstacles he met with in making the required excavations. When he had the conduit installed, no time was wasted in covering it up, and no extra care was given to tamping the filling. A rain storm occurred shortly afterward; the earth naturally settled to its normal condition, the consequence being that the gas and water pipes were unable to withstand the strain, and fractures were the order of the day. The water from the severed water pipes rushed into the gas mains, and the superintendent of the Citizens Company rather strongly expresses his opinion that water gas of this description is hardly up to the proper mark.

Cheaper Gas for Columbus, Indiana.—Mr. C. M. Keller, Secretary of the Columbus (Ind.) Gas Light Company, writes that, on the first of November, 1883, his company reduced the price of gas from $3.20 to $2.70 per thousand cubic feet, with a further discount of 20 cents per thousand if bills be paid within the first five business days of the month in which they are presented, thus bringing the net price down to $2.50.

He was "Skeered"—Secretary Keller is also responsible for the following: "On a recent date the family of one Emerson Davis, comprising himself and wife and five grown sons, took lodgings at the St. Denis Hotel (Columbus, Ind.), to await the next morning's train for Madison. They were from some place in New York, not one of them being able to give the name of the county from which they came. They only knew that they were going to Madison. They were undoubtedly the 'greenest' and most awkward looking lot of human beings ever before seen in one bunch in a civilized country; and it is not in the least surprising that, upon retiring, the gas in each of the rooms which they occupied was blown out. Such was the case; and some time in the night the old man rushed out of his room minus every article of wearing apparel except his shirt, and aroused the guests of the house with his backwoods yells—'Jonathan, Charles, Henri, Bob, Jeems! Come out! I'm skeered, I'm skeered—suthin stinks!' Within a very few minutes the entire family appeared in the halls in their scanty attire, and it was with difficulty and by force, after turning off the gas, that the gentlemen guests, with the landlord and his assistants, succeeded in quieting the wild ruralists from New York and getting them resettled in their rooms."

Natural Gas Company Incorporated.—The Mt. Vernon (Ohio) Natural Gas Company was incorporated on November 8th, with a capital stock of $30,000. The purpose of the company is to supply natural gas for illuminating and heating purposes. From the fact that eleven wells are already in successful operation in the eastern part of Knox county, the incorporators suppose that the same results will follow the experiment to be made at Mt. Vernon.

The St. Louis (Mo.) Injunction Continued.—In the suit of the St. Louis Gas Light Company against the St. Louis Gas, Fuel, and Power Company, Judge Lubke rendered an opinion, on Tuesday, November 13th, sustaining the temporary injunction granted on the 27th of last August, as modified by the order of September 24th, and continuing the same until January 1st, 1890, when the franchise of the plaintiff expires. Execution for the costs of the cause is awarded against defendant.

Reduction in Price of Gas at Covington, Ky.—Mr. W. B. Sellers, Secretary of the Covington (Ky.) Gas Light Company, writes us that on and after January 1st, 1884, his company will reduce the price of gas to private consumers, from the present rate of $2.50, to $2 per thousand cubic feet.

The price to be charged for gas supplied to public lamps and buildings, from same date, will be reduced from $1.25 to $1 per thousand. The contract now existing between the gas company and the city authorities reads: "The city shall be furnished with gas for the use of the street lamps at one-half the price charged to private consumers." This is a decidedly low rate for gas in that section of the country, when all the circumstances of the case are taken into consideration.

THE LYNN (MASS.) HEATING GAS HEARD FROM AGAIN.—At about nine o'clock on the morning of November 17th a man named Kelly, in the employ of the Citizens Steam and Gas Company, of Lynn, Mass., was asphyxiated while making a pipe connection between the building of William A. Brown & Co., and the supply mains of the heating gas concern. Kelly undertook to make the joint without shutting off the gas, with the result above stated; it was some time (in fact three or four days elapsed) before he was pronounced out of danger. The people of Lynn are becoming somewhat uneasy on the subject of the heating gas supplied by the successors of the old Lynn Steam Heating Company, and they have reason to be.

ALTERATIONS AT THE OFFICE OF THE HARTFORD (CONN.) GAS LIGHT COMPANY.—The business offices of the Hartford Gas Light Company, in the Johnson building, on Main street, in the heart of the business center of that city, are being fitted up by Mr. John C. Mead. The floor occupied, which is 96 feet in length, will be divided off into as many apartments as necessary for the wants of the company. On the north side of the room a space will be railed off 6 feet wide and 78 feet long, at the farther end of which will be located the director's room. The offices and desks will all be alongside this passageway, so that people who have business to transact will find themselves accommodated as soon as they enter the door. In front is to be the Secretary's office, 10 × 18 feet, the general office, 14 × 16 feet, the show-room, 20 × 16 feet, the director's room, 12 × 18 feet, adjoining which are the coat and toilet rooms, 6 × 7 feet. The three latter rooms are to be separated from the offices by a partition reaching to the ceiling, while the other sections are to be separated by partitions 7 feet high, made of hard wood and ground glass. The large front window will be utilized to show gas stoves, and other gas apparatus to the best advantage. An elegant fireproof safe, 7 × 16 feet, and 14 feet high, has also been installed, and when everything has been arranged the Hartford Company will be comfortably fixed.

ELECTRIC STORAGE STILL A FAILURE—SO SAYS MR. EDISON, AND SO SAY WE.—Mr. Edison pronounces the recent announcement that the Edison Electric Light Company had purchased the right for the Faure-Sellon-Volckmar electric accumulators throughout Germany as simply a scheme to boom the Faure stock. Mr. Edison says he has no reason to recede from his previous condemnation of alleged storage batteries, but if a good, practicable system of storage ever were discovered he would indorse it, and *probably* use it. He considers that this is a question of chemistry, and not of electricity; and that chemists have so far failed to produce any feasible method of storing electricity, even from a scientific standpoint.

CARELESS BLASTING INJURES A SUPPLY MAIN OF THE NEW YORK MUTUAL GAS COMPANY.—It has often been wondered at that the street inspectors in the pay of the Public Works Department of New York city give such little attention to the duties attaching to their position. Still it is hardly to be expected that so long as these officials are selected simply on account of their qualifications as election "bulldozers," that a better state of affairs will prevail. A glaring case of reckless disregard of the commonest precautions resulted in the fracture of a 20-inch main belonging to the New York Mutual Gas Light Company, and this right under the nose of one of our city street inspectors. In making the excavations for the laying of the Western Union Telegraph Company's pneumatic tubes, on the west side of Fifth avenue, between 14th and 15th streets, a boulder was encountered, in order to dislodge which blasting had to be resorted to. The 20-inch gas main spoken of above extends at that point directly in line with the telegraph company's tube, the latter being laid at a depth of about 8 feet. The gas main, where it had been stripped, was shored with ordinary chain braces, and while in this condition the blast was fired. The rock was reduced to fragments, and so was about 25 feet in length of the Mutual main. It was even then a question whether our street inspector would have known what had occurred were it not for the unpleasant smell engendered. The New York and Mutual gas light companies have had some very unpleasant experiences in the matter of disturbed gas mains, through the operations of several concerns making excavations in their territory, which will be easily brought to mind when the remembrance of the steam heating companies is recalled.

ELECTRIC LIGHT FOR THE PHILADELPHIA (PA.,) COUNCIL CHAMBER.—The Philadelphia Councils are evidently in sore straits for free light. The final disposition of their request to the Gas Trust, that gas be hereafter furnished free to the public buildings, having been postponed until the first of the coming year, they agreed, on November 15, to introduce into the two Council Chambers a system of incandescent electric illumination. The work is to be done free of expense to the city, under the supervision of the Chief Inspector of the police and fire alarm telegraph. The lighting, also, will be of no expense to the city, being furnished by a concern with the queer title of the "Seven State Improvement and Construction Company." The councilmen, affected by the generosity of the company with the wonderful cognomen, and the prospect of getting free light more speedily than the Gas Trust seemed disposed to supply, accepted the proposition at once. It is just like an electric light company to give light away; and we wonder what account the moneys will be taken from to settle the bills which the directors of the "Seven State" Company are sure to send in in the future. Perhaps the Gas Trust fund may be called upon to stand the "milking." Who knows?

AN ELECTRIC LIGHT TOWER.—An iron lighthouse, 60 feet in circumference, has been erected at the lighthouse department station, in Tompkinsville, Staten Island, in which tests will shortly take place as to determining the practicability of using the electric light for lighthouse purposes. It is said that plans are being prepared for a second electric light tower at Hell Gate, which would be placed on the shore opposite the one lately erected there, provided the first one proved a success.

PUT THEM UNDERGROUND.—The Chicago (Ills.) newspapers, of Nov. 16, in their reports of the burning of Kimbark's wagon material factory, explain how the net-work of telegraph, telephone and electric light wires so hemmed in the building as to partially prevent the firemen from reaching it with their hose. The *Times* says, "Much difficulty was experienced by the truck and ladder men in the rapid handling and placing of ladders. The street was somewhat narrow, and the gutter in front of the burning building was dotted with poles, over which hundreds of wires were stretched. It was owing directly to the interference of the wires that the actions of the fire department were impeded and delayed for several minutes." The *Tribune* said, "In elevating the Skinner ladder in order that hose might be carried to the top of the building, the firemen were twice balked by the wires, and twice the truck had to be shifted to overcome the difficulty. Until the ladders were in place very little effective work could be done. The web of telegraph wires was converted by the water and cold into a lacework of ice, which even the heat from the burning structure failed to melt."

It is now pretty well understood that the visit of Dr. Norvin Green, of the Western Union Telegraph Company, to Louisville, Ky., is to oppose the underground conduit enterprise. His company have been beaten in Chicago, Philadelphia, and other places, but are going to make another effort against public policy in Louisville. Sooner or later, and the sooner the better, public opinion will make obligatory upon all telegraph, electric light, and other concerns, stringing wires on the streets, to place the same underground.

THE BOWER-GRIMSTON-THORP REGENERATIVE BURNER.—The delay in the introduction of this burner is due to the fact that Mr. Bower purchased the Thorp patents in August last, and has since adapted the three systems, producing an apparatus that promises to completely fulfill every requirement. Our contemporary, the London *Journal*, notices the fact that "The Grimston and Thorp burners ran one another very closely in the competition at Stockport; and both received the highest commendation at the hands of the judges, who nevertheless gave priority to the Thorp light, which presented rather the better results in illuminating power from the gas consumed. At the same time they accused the Grimston burner of corroding and dimming the lamp-glass. This is a defect that belongs more or less to all Argand and other lights burning in close proximity to glasses; but it is capable of being modified by properly directed air currents. Still, it is impossible to deny that the Grimston lamp, as originally made, did exemplify this failing in a marked degree. It also possessed the vice of 'tailing' in some part or parts of the inverted flame—a circumstance which is not surprising to any one who knows how jet flames tail and smoke on the smallest provocation, and remembers that the Grimston light was composed of a ring of independent jets which sometimes scarcely touched each other. After all, however, the inverted arrangement, with its unrivalled facilities for utilizing the heat of the spent gases, was Mr. Grimston's; and when Mr. Bower took it in hand he simply made such modifications in the parts as were needed to simplify the construction, and prevent the danger of choking and getting out of order to which previously known regenerative burners had been liable. Mr. Thorp, however, has, for his share of the work, perfectly succeeded in curing the inverted flame of tailing, smoking, and corroding the glass; and, therefore, if further faults must be found with the burner they must be waited for, since all the old complaints have apparently been cured, and no new ones have as yet been discovered.

"The new combination is called the Pulmo gas lamp, and its general appearance is that of the Bower-Grimston, with the flame modified by impinging on a disc of specially prepared cement, and with the hanging glass supported by a tube reaching from the flame to the bottom of the glass. The character of the flame however, is very different from that of the earlier models—and, it may be added, from any of the other similarly designed burners, now being exhibited—in being brilliant in color, steady, giving light to the very tip, and burning with a strong, active combustion. The mean is apparently preserved between the illusory whiteness consequent upon an excessive blast of air, and the dull languor of an entirely pressureless flame. This improved result is due to the introduction by Mr. Thorp of what he terms supplementary or secondary regeneration, by which an additional supply of heated air is caused to impinge upon the flame just where it would otherwise become flagging. Whatever the process is called, the effect is magical; and the additional benefit of a cooler and less readily corroded glass is also secured by the same means.

"With regard to the duty of the new lamp, independent authoritative particulars are as yet lacking. It is known, however, that at Stockport the Thorp and Grimston lamps respectively yielded 6.77 and 6.16 candles per cubic foot against 3.5 candles from the standard Argand. There is not much probability that with the improvements just described an inferior result would be obtained; and therefore it is quite probable that common gas in the new combination burner will give twice as much light as in the standard Argand. The burner is made in sizes for 5, 10, and 25 cubic feet per hour; and all the parts are stout, chiefly of cast iron treated by the Bower-Barff rust-preventing process, and not likely to get out of order. It is also expected that the simplicity of construction and materials used will enable the lamps to be sold at very moderate prices.

"The working parts of the burner can be enclosed in opal or frosted glasses of any suitable design—egg-shaped, melon-shaped, and other graceful forms; when the cumbrousness and inelegance heretofore associated with regenerative burners will cease to be a reproach. If the expectations of the manufacturer are realized in these respects, the new burner will have a great future before it."

By a reference to our advertising columns it will be seen that the introduction of the Bower-Grimston-Thorp Duplex regenerative burner in this country is in the efficient hands of Messrs. George Shepard Page, and John Bower, who are already in receipt of numerous orders in advance of the arrival of the goods in the United States. The gas fraternity will be deeply interested to learn the outcome of the tests soon to be made.

Gas Matters at Toledo, Ohio.—The Toledo (Ohio) Gas Light Company began operating its new apparatus last November. The new plant embraces a Mackenzie exhauster, improved condensers and purifiers, and a "Standard" washer-scrubber. The capacity of the Toledo works has been doubled, and the efficiency of the plant is unexcelled by that of any other gas company in the West. The above-mentioned additions and alterations were performed by the Smith & Sayre Manufacturing Company, of this city, under the immediate supervision of the Toledo Company's engineer, Mr. Charles R. Faben, Jr.

News from St. Louis, Mo.—The St. Louis (Mo.) Gas Light Company started the 2,000,000 "Standard" washer-scrubber recently, and its results have proved eminently satisfactory, the ammonia being entirely removed, thus materially lessening the work of the purifiers. Engineer T. G. Lansden continues to keep this company in the front rank of economically managed corporations.

The Laclede Gas Light Company, of St. Louis, Mo., is now under the charge of Mr. Frederic Egner. Mr. E. has instituted a change in the method of obtaining the water supply for the works, he now procuring this principally from the Mississippi river, by direct pumping. This practice enables him to make a large saving in the water rates heretofore annually paid to the city. The Pèlouze-Audouin condenser is in position, and the "Standard" washer-scrubber will be in operation this month.

The Popular Method of Hunting for a Gas Leak Proves Quite Successful.—On the night of November 20th a man named Wm. Foster, residing at No. 640 Jersey avenue, Jersey City, N. J., while searching for a leak of gas, with the usual accompaniment of a naked light in the shape of an assistant, found what he was looking for. The after-results of the "find" were that Foster was badly burned, the front basement windows were blown out, and the steps of a brown stone stoop leading to the parlor floor were sadly demoralized.

Another Electric Accident.—The danger of coming into close contact with an electric light wire when it is conducting the electric current, was experienced on the night of November 20th, by Patrick Russ, proprietor of the European Hotel, opposite the Harrisburgh (Pa.) railroad depot. The electric light being used to illuminate the restaurant attached to the hotel, Mr. Russ had occasion, on the date mentioned, to change one of the globes, when, in some manner, one of his thumbs came in contact with one of the service wires. The thumb was badly burned, and Russ was thrown from the platform on which he was standing with violence to the ground. Medical attention was at once given him, and he was carried to his room. It is supposed that he will recover.

It is Said that they Blew Out the Gas.—A neatly dressed middle-aged couple, who registered, at a late hour of the night of November 21st, as Patrick Dodd and wife, of Utica, N. Y., were given a room at the Pennsylvania Hotel, corner of West and Desbrosses streets, New York city. About seven hours afterward Mr. and Mrs. Dodd were found insensible in bed. The room was filled with gas, which had escaped, and was escaping at the time of the discovery, from a partially turned-off burner. They were taken to the Chambers Street Hospital, and the surgeon attending them said there was a slight chance that the sufferers would recover.

Cheaper Gas for Scranton, Pa.—Mr. George B. Hand, Secretary of the Scranton (Pa.) Gas and Water Company, writes us that, on November first, 1883, his company reduced the price of gas to $2 per thousand cubic feet, subject to the following discounts: On all bills where the consumption for the month amounts to less than $15, ten per cent.; fifteen per cent. on all bills where the consumption for the month amounts to $15; twenty per cent. on all bills where the consumption for the month reaches to $30 and upwards—provided the bills be paid on or before the 20th day of the month in which they are presented. This scale of rates also applies to the gas sold by the Hyde Park Gas Light Company, both these works being operated by the one management.

## The Proposed Sale of the Philadelphia (Pa.) Gas Works.

A proposition has been agitated for some time back looking to the sale of the Philadelphia gas works to private parties—these works, as the majority of our readers are aware, being under the management of the municipal authorities of that city. The negotiations for the transfer had progressed so far that a special meeting of the Philadelphia Common Council was arranged to be held on Wednesday, November 22d, at which session it was supposed the question of the advisability of such a proceeding would be finally disposed of. The following, from the Philadelphia *Press*, presents a pretty clear illustration of the terms upon which the transfer was to be made—

"Shall the city sell the gas works is the very important question to be considered at a special meeting of the Common Councils. There are capitalists ready to buy them if the city is ready to part with them. The question suggests itself, if the gas works are a valuable property, why should not the city hold on to them, and if there is a profit in making gas, why should not the city reap that profit and reduce taxation by that amount?

"The minimum price at which it is proposed to sell the gas works is $10,000,000. It is stipulated in the ordinance that $200,000 shall be paid at the time of the sale, $1,800,000 at the delivery of the deed, and the remainder in annual instalments of $500,000, the unpaid balance to bear interest at the rate of 5 per cent. The 13,000 public lamps, which cost the city $8.50 apiece annually for expenses in lighting and maintaining, are to be paid for at the rate of $25 per lamp, which is $215,000 more a year than the city pays at the present time. The total cost of the gas works is $11,900,000, so the ordinance proposes to allow them to pass into the hands of private owners at nearly $2,000,000 less than they cost the city.

"It does not require very much mathematics to show that in the present condition of the gas works, with their large profits and business increasing unchecked by the electric light invasion, the purchasers of the works at $10,000,000, or even a considerably larger sum, would have a very good thing of it. The burden rests with those proposing to sell this valuable property to show why the people of Philadelphia should not themselves realize the profit incident to its ownership and control, rather than assign it to a syndicate of capitalists at less than cost, and stipulating in addition to pay $215,000 a year for the street gas it now burns without charge. The reasons against the proposed sale are so strong, certainly, as to make it the duty of Councils to proceed with extreme caution in the matter. The only argument in favor of the sale, of any real force, is the difficulty of a city managing such a piece of property honestly and economically. There undoubtedly have been grave scandals associated with the management of the city's gas property in the past, but we are unwilling to admit that it is impossible to have a satisfactory management of the gas works by the city any more than of the water or other public works.

"If, however, under the influence of a contrary belief, it is determined to put the property into private management, why should not the works be leased rather than sold. This could readily be done for a term of years on conditions mutually advantageous to the lessees and the city. This would get rid of the city's management of gas works under the present

complicated city government, and leave the question of ownership open to be considered hereafter, under, perhaps, entirely different circumstances."

[The meeting of the Council was duly held on the date advertised—but no settlement of the question was had, the matter having been indefinitely postponed.—Ed.]

## The Market for Gas Securities.

The market for city gas shares exhibited remarkable strength during the past fortnight, and the advance in prices has been general "all along the line." The following figures show the changes that have taken place since the previous time of writing: Manhattan gas we quote at 237 bid, 240 asked; Harlem, 113 to 115; Metropolitan, 190 to 195; Mutual, 118 to 119; Municipal, 190 to 192; New York, 133 to 135; Equitable, 94 to 97; Central, 60 bid. A great deal of trouble has been occasioned among the holders of this last-named (Central) stock owing to the fact that the directors of the company recently made issue of a scrip dividend of 50 per cent. The scrip really partakes of the nature of preferred stock, coming in, as it does, for participation in the first earnings of the company which may be applicable for the purpose of paying dividends. The Central people, by this action, make themselves liable to largely increased taxation without in any manner benefiting the holders of the old stock, and certainly does not show any burning desire on the part of the management to render cheaper gas a possibility in that portion of New York city in which they are doing business.

The Brooklyn muddle is not yet "settled," and it is more than likely that "piping times" are still in store for the "grabbers" who supposed they had everything all fixed up. The Nassau Company positively refuses to enter into any arrangement, and, we believe, is fully resolved upon an aggressive policy. It would appear to us that the Nassau people are now in possession of the key to the situation, and will be able to use the said key rather effectively. As a general rule Brooklyn gas shares are all strong and higher. Here are the figures: Brooklyn, 128 to 130; Citizens, 90 to 92; Fulton Municipal, 110 to 115; Peoples, 75 to 82; Metropolitan, 88 to 92; Nassau, 70 bid; Williamsburgh 110 to 115.

During the month ending October 31, the following dividends were paid on San Francisco gas stocks: Capital gas, quarterly, $1.25 per share, aggregating $12,500; San Francisco gas, quarterly, 80 cents per share, equal to $80,000; Oakland gas, 20 cents per share, equal to $6,000.

# Correspondence

[The Journal is not responsible for the opinions expressed by correspondents.]

### Stopped Standpipes.

New York, Nov. 27, 1883.

To the Editor American Gas Light Journal:—

In the admirable paper of Mr. Pratt, read before the American Gas Light Association, and published in your issue of November 2, the question is asked: "The stoppage of your standpipes—how shall they be prevented?" The following, a part of my experience, may be of service to many of your readers: I had four benches of sixes, with regenerative furnaces. We had as many as thirty-five stopped pipes, in these benches, in one night, and ten or more on each shift was the common experience. I caused a water pipe to be laid in front of the *worst* bench of the four, and directed a small stream of water against each pipe. Around the pipe, below the water, was wound a rag or piece of old rope; and this guided the stream of water around the pipe, so that at least that half facing the brick-work, was always wetted. The amount of water was graduated so that none, or only a very little, would get as far as the mouthpieces. The result was that we had no stopped pipe in *that* bench for over six weeks. Now, what do you suppose I did with the rest of my benches? This can easily be tried; it is so simple and does not cost much. How, and why, standpipes stop seems easy enough of explanation, but sufficient has been said, and well said, on *that* subject before this, in your columns. Yours truly,

"O."

### The Location of Meters, Gas Distribution, etc.

New York, Nov. 22, 1883.

To the Editor American Gas Light Journal:

I observe that the subject of the location of meters was a question before the American Gas Light Association, and, as no definite result was reached, perhaps a little further ventilation of the subject will be in order—although I shall treat upon it from an entirely different standpoint. In passing I might observe, in answer to Mr. Cornell's paper, that although the old adage assigns "a place for everything, and everything in its place," yet another says "there is no rule without an exception;" and I cannot see how the dignity of the profession can be affected, whether the meter is in the cellar or in any other place.

If a whole building be under one control, the meter will ordinarily be found in the cellar or on the first floor (its proper place); but if each floor have a separate tenant, then the cellar is not the proper place, but rather on the floor which each tenant occupies, when looked at from a purely mechanical point; but I now propose to treat the matter scientifically. To illustrate our subject, we will place four meters in a cellar to supply the same number of burners, of the same capacity, and burning an equal number of hours, yet it will be found that every meter has a different registration—the second floor meter will register more than the first, the third more than the second, and the fourth will beat them all. Suppose this is a flat apartment-house, occupied by Mrs. "A.," "B.," "C.," and "D." They compare their gas bills, and then and there a rod is put in pickle for the gas company, and laid on to the back of the collector. Now, how is this brought about? Very simply. For example, say the normal pressure in the cellar is 15 tenths, and that the building is 50 feet high; consequently the pressure on the top floor will be 20 tenths; but when the gas is burning at night the discrepancy is still greater—the upper floors will have gas to waste, while the lower floors will not get enough for their needs. In places where the initial gas supply is poor these conditions are felt to such an extent that, while the upper floor gets a good light, the lower ones will get no light at all. But then, you say, if you place a separate meter on every floor the same effect is bound to follow. Just so—that is, if you won't do anything to prevent it; yet what is easier than for the company's agent to inform the consumers of this fact? If the meter is on the floor he occupies, let him light all burners, with the gas full on at the meter, turning off the excess at the main cock, and leave it—as, in practice, consumers will not take the trouble to turn off the gas at the meter every night, were it ever so convenient; or, what would be better still, if each large consumer put in a pressure gauge, and was informed as to the amount of pressure requisite to be employed. Still, if all the meters are in the cellar this is not possible.

Mr. Pearson's reasons for putting the meters in cellars are rather unique. A thief will be a thief all the world over, but he is seldom fool enough to ask another man (who may be honest) to pick a lock for him in order that he may steal the contents of a safe. Another of Mr. Pearson's safeguards, the reason of which I never could understand, is to lock and seal the outlet coupling to the top of the meter, or whether he has any justification for so doing by the gas and meter laws of Canada. It is generally admitted that when the gas has passed the meter it becomes the property of the consumer, to regulate it or not as he pleases.

Coming back to the mechanical details, and the objections to putting all the meters in the cellar, say, for a "flat" house, what do we find—

1st. A great deal of unnecessary expense incurred in putting separate "risers" to each flat and suite of rooms, entailing extra risks from leakage.

2d. The tenant has no control of his meter, does not know even where it is, and would not know it if he saw it. Consequently, he is bound to be dissatisfied; and where there are a number of the same-sized meters it would be very easy for the index taker to mistake Mrs. "A's" meter for Mrs. "B's;" whereas, if one "riser" went through the building, with outlets at every floor or suite of rooms, the company could supply easier, and the excess of pressure could be regulated by the different main cocks as the higher levels are reached.

I know one house, on Fifth avenue, in this city, that has nearly twenty meters in its cellar, and, of course, as many "risers." The house (a French flat) was not occupied six months, when, in consequence of the complaints of the tenants, the owner of the same consulted me as to the possibility of changing the whole system, by placing the meters under the direct control of the tenants on their separate floors, but the change was not possible within any reasonable expenditure.

While upon the question of fittings and pressure; it is a problem how to so equalize the pressure as to get as good a light in the basement as on the top floor, without having too great an excess in the latter situation, and which must be done either at the expense of the gas company or the gas consumer. Various devices have been brought to bear in the solution of this difficulty, in the shape of regulating or check burners—but the evil is still present. A plan has occurred to me; it may be purely theoretical, but I should like to see it tested.

To fit up an entire house, or factory, under one control, I would fit up in the ordinary manner as to riser and running lines, until we get to the end of the last runner on the top floor. I would then start down again, with a pipe one-quanter the size of the riser, taking up the dead ends of the different running lines, finishing at the first floor, by which means I get a circuit, and the excessive pressure in the upper floors is equalized by having to descend to the lower part of the house. Yours, etc.,

John Keeling, C. E.

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| Manhattan | 4,000,000 | 50 | 237 | 240 |
| Metropolitan | 2,500,000 | 100 | 190 | 195 |
| " Bonds | 658,000 | — | 105 | 110 |
| Mutual | 3,500,000 | 100 | 118 | 119 |
| " Bonds | 1,500,000 | 1000 | 104 | 106 |
| Municipal | 3,000,000 | 100 | 190 | 192 |
| " Bonds | 750,000 | | 106 | 110 |
| New York | 4,000,000 | 100 | 133 | 135 |
| Northern | 125,000 | 50 | 70 | 80 |
| " Scrip | 108,000 | | | |
| Gas Co's of Brooklyn. | | | | |
| Brooklyn | 2,000,000 | 25 | 128 | 130 |
| Citizens | 1,200,000 | 20 | 90 | 92 |
| " S. F. Bonds | 320,000 | 1000 | 106 | 110 |
| Fulton Municipal | 1,500,000 | 100 | 110 | 115 |
| " Bonds | 300,000 | | 104 | 108 |
| Peoples | 1,000,000 | 10 | 80 | 82 |
| " Bonds | 290,000 | — | 105 | 110 |
| " " | 250,000 | — | 90 | 95 |
| Metropolitan | 1,000,000 | 100 | 88 | 92 |
| Nassau | 1,000,000 | 25 | 70 | — |
| " Ctfs | 700,000 | 1000 | 85 | 90 |
| Williamsburgh | 1,000,000 | 50 | 110 | 115 |
| " Bonds | 1,000,000 | — | 104 | 108 |
| Richmond Co., S. I. | 300,000 | 50 | — | 75 |
| " Bonds | 40,000 | — | — | — |
| Out of Town Gas Companies. | | | | |
| Buffalo Mutual, N. Y. | 750,000 | 100 | 80 | 85 |
| " Bonds | 200,000 | 1000 | 95 | 100 |
| Citizens, Newark | 918,000 | 50 | 80 | 85 |
| " " Bonds. | 124,000 | — | 105 | 10 |
| Chicago Gas Co., Ills | | | 150 | 155 |
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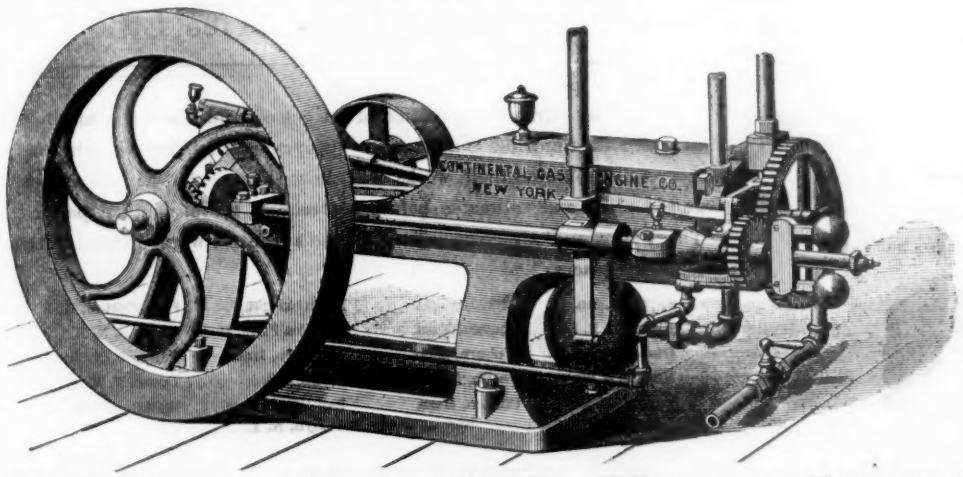


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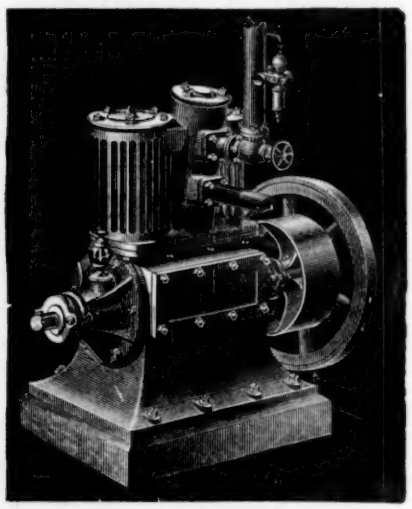

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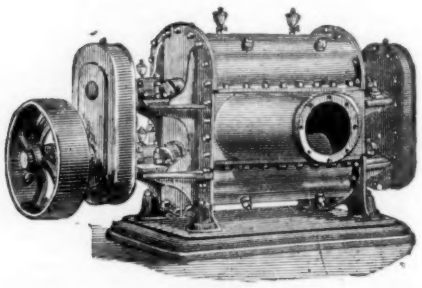

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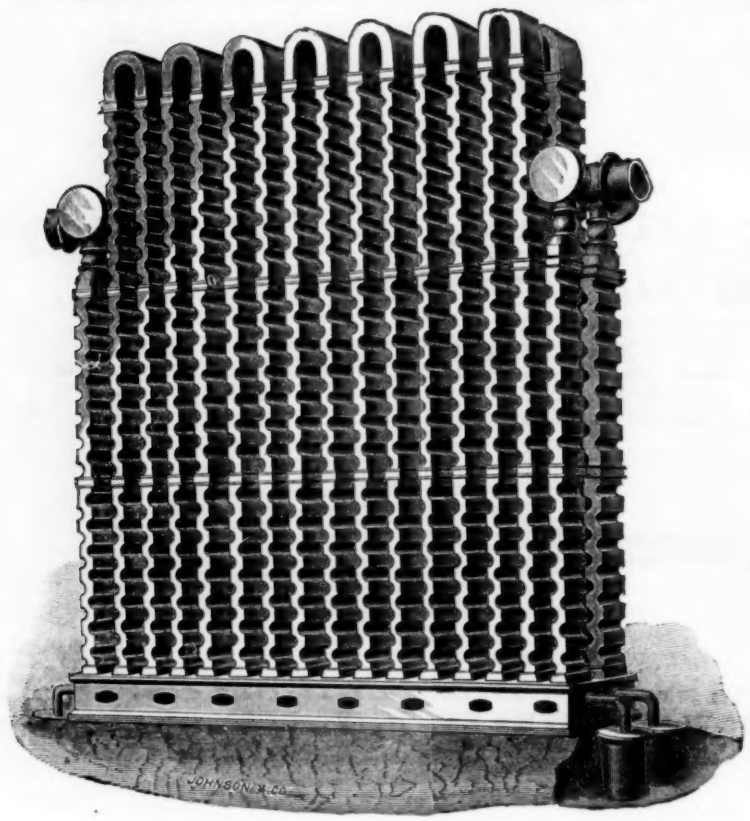


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